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ABSTRACT

A study identifying the relationships between quantitative academic characteristics--specifically, grade point average (GPA) and MCAT scores--and admission into medical school for minorities is presented. Explanations are proposed for contradictory findings related to this question that have appeared in literature. Data from 58 minority student participants in the University of Virginia School of Medicine summer academic enrichment programs who went on to apply to medical school were analyzed. The 49 students who were offered medical school acceptance ultimately enrolled in 17 different medical schools. The major study findings are as follows: the variables that together best explained a statistically significant proportion of the variance in medical school admissions decisions for minority students were performance on the MCAT quantitative subtest, on the MCAT reading subtest, and on the MCAT physics subtest; the three variables with the strongest simple correlations with admission into medical school were performance on the MCAT quantitative subtest, on the MCAT science subtest, and on the MCAT physics subtest; overall GPA did not explain a significant proportion of the variance in the medical school admissions decisions, either alone or in combination with other variables; and the study findings conflict in several ways with the reported results of two previous studies. The conclusions of the current study should be considered preliminary because of the relatively small sample size and the need for comparison data on non-minority students. Tables are included. Contains 2 references. (Author/SM)

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PREDICTING ADMISSION OF MINORITIES INTO MEDICAL SCHOOL

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ABSTRACT

The primary purpose of the study was to identify relationships between quantitative academic characteristics (specifically, GPA and MCAT scores) and admission into medical school for minority students. A secondary purpose was to propose explanations for contradictory findings related to this question which have appeared in the literature.

Data from 58 minority student participants in University of Virginia School of Medicine summer academic enrichment programs who went on to apply to medical school were analyzed. The 49 students who were offered medical school acceptance ultimately enrolled in 17 different medical schools. Results of a stepwise multiple regression analysis indicated that scores on the Quantitative section of the MCAT explained the greatest proportion of the variance (26%) related to medical school admission, scores on Reading the next greatest (an additional 7%), and scores on Physics the next greatest (5%). Overall GPA did not contribute significantly to the explanation of the variance in admissions decisions. These results differ from two earlier studies in which the data were derived from applications to a single institution; those findings may have been reflective of institutions' differing admissions procedures or different applicant sample characteristics. Caution must therefore be exercised when using these quantitative variables as admission predictors.

PREDICTING ADMISSION OF MINORITIES INTO MEDICAL SCHOOL

Background and Research Objectives

Previous studies (Rindskopf & Everson, 1984; Montecinos & Pohlmann, 1987) which have examined the relationships between quantitative academic variables and the acceptance of minority students into medical school have produced contradictory results. While the authors of both the 1984 and 1987 studies found that GPA and MCAT scores were related to medical school admissions decisions for minority students, Rindskopf and Everson concluded that the relationship between these variables was stronger for whites than for minorities; Montecinos and Pohlmann, on the other hand, concluded that these same predictors of medical school admission applied similarly to minority and majority applicants. Both studies based their conclusions on applicant data from a single medical school - one located in the midwest, and the other in the northeast.

A problem with interpreting the results of studies such as the two cited above is that the dissimilar findings may reflect dissimilar admissions practices being implemented at the two schools. In order to draw more generalizable conclusions about the relationships being examined, data on minority students' acceptance to a larger sample of medical schools are needed.

The primary objective of this study was to identify relationships between quantitative academic variables (specifically, GPA and MCAT scores) and the acceptance of minority students into medical school, through analyses of data from students entering a variety of medical schools across the country. A secondary purpose was to posit possible explanations for the contradictory

findings concerning these relationships, which have been published in professional journals.

Methods and Data Source

Since 1984, the University of Virginia School of Medicine has been conducting summer enrichment programs (the Medical Academic Advancement Program, or MAAP) for minority and disadvantaged students interested in medicine. The program's goals are to increase the rate of minority student admission into and graduation from medical school. Of 74 MAAP participants who could have completed the medical school application process at the time this study was conducted, 58 had applied to medical school, and 49 had been accepted. While the University of Virginia School of Medicine encourages MAAP participants to apply to UVA, and indeed has a solid record of accepting these students (25 have become UVA medical students), it is considered a measure of program success when a student is accepted into any medical school.

Analyses of the relationships between admission into medical school and GPA and MCAT scores were done using data from the 58 MAAP participants who have applied to medical school. The 49 students who were offered acceptances ultimately enrolled in 17 different medical schools (see Table 1).

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Insert Table 1 about here

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Consequently, the results of these analyses do not reflect a single medical school's admissions procedures.

Both simple correlations and multiple regression analyses were used. The result of the admission decision (admitted or not admitted) was considered as

Table 1

Medical Schools In Which MAAP Participants Have Enrolled

Medical School Attending	N
Case Western Reserve University School of Medicine	1
Duke University School of Medicine	1
Eastern Virginia Medical School	1
Harvard Medical School	1
Howard University College of Medicine	2
Meharry Medical College School of Medicine	1
Morehouse School of Medicine	1
New York Medical College	1
Ohio State University College of Medicine	1
Pennsylvania College of Podiatric Medicine	2
Philadelphia Osteopathic School of Medicine	1
Temple University School of Medicine	2
University of Maryland School of Medicine	2
University of California, San Francisco School of Medicine	1
University of Virginia School of Medicine	25
Virginia Commonwealth University Medical College of Virginia	5
Wayne State University School of Medicine	1

the dependent variable, and overall GPA and MCAT subtest scores were considered as independent or explanatory variables.

Results

The variables which had the largest simple correlations with being admitted into medical school were MCAT scores on the Quantitative and Science Problem-Solving subtests, while the smallest correlations were found for the MCAT Reading subtest and overall GPA (see Table 2).

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Insert Table 2 about here

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Because many of the explanatory variables were highly intercorrelated, a forward stepwise multiple regression analysis was also done. Three MCAT subtests achieved the significance levels necessary to enter the regression equation, in the following order: Quantitative, Reading, and Physics. These three factors together explained 38% of the variance in the admissions decisions (please see Table 3). The inclusion of overall GPA did not add significantly to the proportion of explained variance.

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Insert Table 3 about here

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Discussion

The results of this study are at variance with those of the two earlier studies in several ways. First, when examining the simple correlations between admission into medical school and the 7 explanatory variables (GPA, and the 6 MCAT subtest scores), Lynch and Woode found that overall GPA had the second weakest correlation with admission; in the Montecinos and Pohlman

Table 2

Correlations and Intercorrelations of Variables Examined*

	Biol	Chem	Phys	Scie	Read	Quan	Admitted
GPA	-.012	.216	-.054	.132	-.078	.126	.237
Biol		.578	.540	.782	.514	.652	.385
Chem			.613	.819	.483	.628	.412
Phys				.772	.463	.551	.438
Scie					.478	.702	.504
Read						.736	.195
Quan							.509

*Variables were overall GPA, MCAT subtest scores, and admission decision (1=admitted, 0=not admitted).

Table 3

Summary of Forward Stepwise Regression Procedure

Step	Variable	Partial R^2	Model R^2	F	Prob>F
1	MCAT Quant.	.259	.259	13.620	0.001
2	MCAT Reading	.070	.329	3.997	0.05
3	MCAT Physics	.047	.377	2.800	0.10

study, overall GPA had the strongest correlation. Rindskopf and Everson, who separated Science- and non-Science GPAs in their analyses, found that while Science GPA had the strongest correlation with admission for white students, its correlation for minority students was much weaker (5th out of the 7 variables) - a result more comparable with the findings of Lynch and Woode.

A second way in which the results of the current study differ from those of the earlier studies is the importance of the MCAT Quantitative subtest scores. While Lynch and Woode found that performance on the Quantitative subtest was the single variable with the strongest relationship to admission into medical school, neither Montecinos and Pohlman nor Rindskopf and Everson found Quantitative subtest scores to be strongly related to admission. The results of all three studies are similar in that the simple correlation between scores on the Reading subtest of the MCAT and admission to medical school was either the lowest or second lowest of the 7 possible explanatory variables.

Because of the intercorrelations among the explanatory variables, all studies also reported results of regression analyses, using admission decision as the dependent variable and some form of GPA and MCAT subtest scores as independent or explanatory variables. In contrast to the other two studies, Lynch and Woode did not find GPA to contribute significantly to the proportion of explained variance in the distribution of admissions decisions; another differing finding was that performance on the MCAT Reading subtest added a significant amount to the proportion of explained variance.

To be more specific, when using the same significance level cutoffs employed by Montecinos and Pohlman, Lynch and Woode found that performance on the MCAT Quantitative subtest explained the greatest proportion of variance in

the admissions decisions, with performance on the Reading subtest contributing an additional statistically significant proportion; with only these two variables in the regression equation, 32.9% of the variance was explained. Overall GPA did not contribute significantly to the proportion of explained variance, either alone or in combination with other variables. Montecinos and Pohlman, on the other hand found, that overall GPA and the MCAT Physics subtest scores were the only two variables to enter the regression equation in their study, explaining 13.6% of the variance. Rindskopf and Everson used a variety of regression approaches and found that Science GPA, the average MCAT subtest score, race, and interactions among these variables explained 39.3% of the variance in admissions decisions for their sample. The results of the three studies are presented in summary fashion in Table 4 to facilitate comparisons.

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Insert Table 4 about here

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Rindskopf and Everson concluded that the results of their study indicated that the quantitative academic variables operate differently for minority and non-minority candidates. Montecinos and Pohlman, on the other hand, concluded that, because their results for minority students were comparable to the results for the Rindksopf and Everson non-minority sample, therefore the quantitative academic variables operate similarly for minority and non-minority students. Both of these studies relied on data from applicants to a single institution. The Lynch and Woode results for minority students from 17 different medical schools are most similar to those found by Rindskopf and Everson in their sample of minority students, in terms of the order of

Table 4

Results of Studies Relating

Quantitative Academic Variables to Admission into Medical School

for Minority and Non-Minority Applicants

Authors	Rindskopf & Everson, 1984		Montecinos & Pohlman, 1987	Lynch & Woode, 1988
Data Source	1 institution		1 institution	17 institutions
	CORRELATION COEFFICIENTS			
Variables	Minority	Non-Minority	Minority	Minority
Overall GPA	N.A.	N.A.	.298	.237
Science GPA	.177	.344	.293	N.A.
Non-science GPA	.150	.191	.259	N.A.
MCAT Biol	.210	.233	.297	.385
MCAT Chem	.192	.269	.099	.412
MCAT Phys	.188	.229	.286	.438
MCAT Scie	.209	.235	.236	.504
MCAT Read	.160	.180	.002	.195
MCAT Quan	.157	.228	.021	.509
Regression Results	Science GPA, Average MCAT Subtest, Race, Interactions		Overall GPA, MCAT Physics	MCAT Quant., MCAT Reading
	explain 39.3% of the variance		explain 13.6% of the variance	explain 32.9% of the variance

importance of the correlation coefficients, and the amount of variance explained by the regression equations. However, the authors of this paper suggest that additional analyses would be needed, using a sample of non-minority applicants to the various medical schools represented in their study, in order to determine whether the Lynch and Woode findings support Rindskopf and Everson's or Montecinos and Pohlman's conclusion.

The differences between the findings of the 1984 and 1987 studies may be attributable to different admissions practices and/or different characteristics of the applicant pools from which the data were derived. Montecinos and Pohlman used data from all minority applicants to a midwestern university school of medicine for the freshman year 1985, and Rindskopf and Everson selected a random sample of minority and white applicants to a northeastern state university medical school from the total applicant pool for 1979 to 1980. Changes in the applicant pools over the approximately 5 years between studies may have affected the results. The data for the Lynch and Woode study were collected over the years 1984 through 1988, a time span closer to the Montecinos and Pohlman study's. Given the differences in the findings of these studies, however, it is suggested that drawing conclusions about the relationships between quantitative academic variables and the admission of minorities into medical school through the use of data from a single medical school may involve making assumptions about the applicant pool which do not apply across medical schools.

Summary

The major findings of this study were the following:

1. The variables which together best explained a statistically significant proportion of the variance in medical school admissions decisions

for minority students were, in order of importance: performance on the MCAT Quantitative subtest, performance on the MCAT Reading subtest, and performance on the MCAT Physics subtest. These 3 factors accounted for almost 38% of the variance.

2. The three variables with the strongest simple correlations with admission into medical school were, in order of size of the correlation coefficient: performance on the MCAT Quantitative subtest (r = .509), performance on the MCAT Science subtest (r = .504), and performance on the MCAT Physics subtest (r = .438).

3. Overall GPA did not explain a significant proportion of the variance in the medical school admissions decisions, either alone or in combination with other variables.

4. The findings of this study, which are based on quantitative academic data for minority and disadvantaged students accepted into 17 different medical schools, conflict in several ways with the reported results of two previous studies, each of which analyzed data from a single medical school. The conclusions of the current study should be considered preliminary, both because of the relatively small sample size and because of the need for comparison data on non-minority students. As the University of Virginia School of Medicine summer enrichment programs continue, the database will be enlarged, and analyses will be updated to determine whether the relationships found still hold. Additional analyses using data from non-minority students will also be conducted to examine whether the findings apply similarly to non-minority and minority applicants.

The authors suggest that caution be exercised in drawing conclusions about the relationships between quantitative academic variables and the

admission of minority students into medical school, when the data on which these conclusions are based arise from a single institution. In order to identify more generalizable relationships among these variables, it is recommended that further research on this question draw on data from a variety of medical schools.

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